

WHAT IS CLAIMED IS:

1. A parallel reaction device, comprising:

5 (a) a reaction block comprising an array of reaction wells, wherein at least one reaction well in the array is disposed through the reaction block, which reaction well comprises an inlet portion and an outlet portion;

(b) a top lid attached to the reaction block by at least one top attachment component, which top lid comprises at least one protrusion disposed on a surface that engages the reaction block, which protrusion presses a top gasket into contact with the
10 inlet portion of the reaction well to seal the inlet portion; and,

(c) a bottom lid attached to the reaction block by at least one bottom attachment component, which bottom lid presses a bottom gasket into contact with the outlet portion of the reaction well to seal the outlet portion.

15 2. The parallel reaction device of claim 1, wherein the reaction block is disposable.

3. The parallel reaction device of claim 1, wherein the reaction block comprises cavities disposed between and proximal to inlet portions of adjacent reaction wells to direct fluidic materials away from other inlet portions.

20 4. The parallel reaction device of claim 1, wherein at least a segment of the reaction well comprises an inner and an outer cross-sectional shape independently selected from the group consisting of: a regular n-sided polygon, an irregular n-sided polygon, a triangle, a square, a rounded square, a rectangle, a rounded rectangle, a trapezoid, a circle, and an oval.

25 5. The parallel reaction device of claim 1, wherein at least two regions of the reaction well comprise different inner or outer cross-sectional dimensions.

6. The parallel reaction device of claim 1, wherein one or more reaction wells further comprise a filter disposed therein.

7. The parallel reaction device of claim 1, wherein outlet portions of the array of reaction wells comprise a footprint that corresponds to wells of a micro-well plate.

8. The parallel reaction device of claim 1, wherein the outlet portion comprises an outlet spout having a smaller inner cross-sectional dimension than other regions of the reaction well, and wherein a transition area between the outlet spout and the other regions in the reaction well is abrupt or tapered.

9. The parallel reaction device of claim 1, wherein the protrusion prevents leakage of fluidic materials from the inlet portion, thereby reducing cross-contamination among the reaction wells.

10. The parallel reaction device of claim 1, wherein the protrusion comprises at least one protruding annular ridge that presses the top gasket into contact with the inlet portion of the reaction well to radially seal the inlet portion.

11. The parallel reaction device of claim 1, wherein the top lid comprises an array of protrusions that corresponds to the array of reaction wells.

12. The parallel reaction device of claim 1, wherein the top lid produces a substantially even clamp load across all inlet portions.

13. The parallel reaction device of claim 1, wherein the top attachment component comprises at least one hinge and at least one latch.

14. The parallel reaction device of claim 1, wherein the bottom lid produces a substantially even clamp load across all outlet portions.

15. The parallel reaction device of claim 1, wherein the bottom attachment component comprises at least one hinge and at least one latch.

16. The parallel reaction device of claim 1, wherein the bottom lid further comprises at least one protrusion disposed on a surface that engages the reaction

block, which protrusion presses the bottom gasket into contact with the outlet portion of the reaction well to seal the outlet portion.

17. The parallel reaction device of claim 1, wherein the top and bottom lids are removably attached to the reaction block.

5 18. The parallel reaction device of claim 1, wherein the top and bottom lids open independently of one another.

19. The parallel reaction device of claim 1, wherein the top and bottom lids comprise metallic or polymeric materials.

10 20. The parallel reaction device of claim 1, wherein the top and bottom lids each comprise at least a first alignment structure complementary to at least a second alignment structure on a controller apparatus to align the parallel reaction device relative to the controller apparatus.

21. The parallel reaction device of claim 1, wherein the top gasket comprises at least one protrusion, which protrusion axially aligns with the inlet portion.

15 22. The parallel reaction device of claim 1, wherein the bottom gasket comprises at least one protrusion, which protrusion axially aligns with the outlet portion.

23. The parallel reaction device of claim 1, wherein the top and bottom gaskets comprise sheets of gasketing material.

20 24. The parallel reaction device of claim 1, wherein at least one of the top and bottom gaskets comprises an array of protrusions, wherein at least one protrusion axially aligns with the reaction well.

25. The parallel reaction device of claim 1, wherein the reaction block comprises one or more of: glass, metal, or a polymer.

25 26. The parallel reaction device of claim 25, wherein the polymer comprises polytetrafluoroethylene.

27. The parallel reaction device of claim 1, wherein the reaction block comprises 6, 12, 24, 48, 96, 384, 1536, or more reaction wells.

28. The parallel reaction device of claim 27, wherein each reaction well is disposed through the reaction block.

5 29. The parallel reaction device of claim 1, wherein the top lid further comprises an array of apertures disposed through the top lid, wherein at least one aperture axially aligns with the reaction well.

 30. The parallel reaction device of claim 29, wherein fluidic materials are introduced into the reaction well through the aperture and the top gasket through a
10 needle.

 31. The parallel reaction device of claim 29, wherein the aperture is tapered.

 32. The parallel reaction device of claim 29, wherein each member of the array of apertures axially aligns with a different reaction well.

15 33. The parallel reaction device of claim 29, wherein the protrusion comprises a protruding annular ridge disposed around the aperture.

 34. The parallel reaction device of claim 33, wherein the protruding annular ridge presses the top gasket into contact with the inlet portion of the reaction well to radially seal the inlet portion.

20 35. The parallel reaction device of claim 1, wherein the reaction block comprises at least one pair of substantially opposing recessed regions disposed in opposing surfaces of the reaction block proximal to a midpoint of each surface, which opposing recessed regions mount the top and bottom attachment components.

 36. The parallel reaction device of claim 35, wherein the top and bottom
25 attachment components comprise:

(i) a band disposed around the reaction block in the opposing recessed regions, wherein the band comprises at least one first top hinge component, at least one first top latch component, at least one first bottom hinge component, and at least one first bottom latch component;

5 (ii) at least one second top hinge component and at least one second top latch component attached to the top lid, wherein the second top hinge component removably engages the first top hinge component and the second top latch component removably engages the first top latch component; and,

10 (iii) at least one second bottom hinge component and at least one second bottom latch component attached to the bottom lid, wherein the second bottom hinge component removably engages the first bottom hinge component and the second bottom latch component removably engages the first bottom latch component.

37. The parallel reaction device of claim 36, wherein each hinge component independently comprises a male or a female lift-off hinge component.

15 38. The parallel reaction device of claim 36, wherein each latch component independently comprises a latch body or a keeper plate.

39. The parallel reaction device of claim 38, wherein the latch body comprises a rotatable draw latch body.

40. A parallel reaction device, comprising:

20 (a) a reaction block comprising an array of reaction wells, wherein at least one reaction well in the array is disposed through the reaction block, which reaction well comprises an inlet portion and an outlet portion;

 (b) a top lid attached to the reaction block by at least one top hinge component and at least one top latch component, which top lid presses a top gasket into contact with
25 the inlet portion to the reaction well to seal the inlet portion; and,

 (c) a bottom lid attached to the reaction block by at least one bottom hinge component and at least one bottom latch component, which bottom lid presses a bottom gasket into contact with the outlet portion of the reaction well to seal the outlet portion.

41. The parallel reaction device of claim 40, wherein the reaction block is disposable.

42. The parallel reaction device of claim 40, wherein the reaction block comprises cavities disposed between and proximal to inlet portions of adjacent reaction wells to direct fluidic materials away from other inlet portions.

43. The parallel reaction device of claim 40, wherein at least a segment of the reaction well comprises an inner and an outer cross-sectional shape independently selected from the group consisting of: a regular n-sided polygon, an irregular n-sided polygon, a triangle, a square, a rounded square, a rectangle, a rounded rectangle, a trapezoid, a circle, and an oval.

44. The parallel reaction device of claim 40, wherein at least two regions of the reaction well comprise different inner or outer cross-sectional dimensions.

45. The parallel reaction device of claim 40, wherein one or more reaction wells further comprise a filter disposed therein.

46. The parallel reaction device of claim 40, wherein outlet portions of the array of reaction wells comprise a footprint that corresponds to wells of a micro-well plate.

47. The parallel reaction device of claim 40, wherein the outlet portion comprises an outlet spout having a smaller inner cross-sectional dimension than other regions of the reaction well, and wherein a transition area between the outlet spout and the other regions in the reaction well is abrupt or tapered.

48. The parallel reaction device of claim 40, wherein the top lid produces a substantially even clamp load across all inlet portions.

49. The parallel reaction device of claim 40, wherein the top hinge component comprises at least one lift-off hinge.

50. The parallel reaction device of claim 40, wherein the bottom hinge component comprises at least one lift-off hinge.

51. The parallel reaction device of claim 40, wherein the bottom lid produces a substantially even clamp load across all outlet portions.

5 **52.** The parallel reaction device of claim 40, wherein the top lid further comprises at least one protrusion disposed on a surface that engages the reaction block, which protrusion presses the top gasket into contact with the inlet portion of the reaction well to seal the inlet portion.

10 **53.** The parallel reaction device of claim 40, wherein the bottom lid further comprises at least one protrusion disposed on a surface that engages the reaction block, which protrusion presses the bottom gasket into contact with the outlet portion of the reaction well to seal the outlet portion.

54. The parallel reaction device of claim 40, wherein the top and bottom lids are removably attached to the reaction block.

15 **55.** The parallel reaction device of claim 40, wherein the top and bottom lids open independently of one another.

56. The parallel reaction device of claim 40, wherein the top and bottom lids comprise metallic or polymeric materials.

20 **57.** The parallel reaction device of claim 40, wherein the top and bottom lids each comprise at least a first alignment structure complementary to at least a second alignment structure on a controller apparatus to align the parallel reaction device relative to the controller apparatus.

58. The parallel reaction device of claim 40, wherein the top gasket comprises at least one protrusion, which protrusion axially aligns with the inlet portion.

25 **59.** The parallel reaction device of claim 40, wherein the bottom gasket comprises at least one protrusion, which protrusion axially aligns with the outlet portion.

60. The parallel reaction device of claim 40, wherein the top and bottom gaskets comprise sheets of gasketing material.

61. The parallel reaction device of claim 40, wherein at least one of the top and bottom gaskets comprises an array of protrusions, wherein at least one protrusion axially aligns with the reaction well.

62. The parallel reaction device of claim 40, wherein the reaction block comprises one or more of: glass, metal, or a polymer.

63. The parallel reaction device of claim 62, wherein the polymer comprises polytetrafluoroethylene.

64. The parallel reaction device of claim 40, wherein the reaction block comprises 6, 12, 24, 48, 96, 384, 1536, or more reaction wells.

65. The parallel reaction device of claim 64, wherein each reaction well is disposed through the reaction block.

66. The parallel reaction device of claim 40, wherein the top lid further comprises an array of apertures disposed through the top lid, wherein at least one aperture axially aligns with the reaction well.

67. The parallel reaction device of claim 66, wherein fluidic materials are introduced into the reaction well through the aperture and the top gasket through a needle.

68. The parallel reaction device of claim 66, wherein the aperture is tapered.

69. The parallel reaction device of claim 66, wherein each member of the array of apertures axially aligns with a different reaction well.

70. The parallel reaction device of claim 66, further comprising a protruding annular ridge disposed around the aperture.

71. The parallel reaction device of claim 70, wherein the protruding annular ridge presses the top gasket into contact with the inlet portion of the reaction well to radially seal the inlet portion.

72. A reaction block comprising an array of reaction wells, wherein at least one reaction well in the array is disposed through the reaction block, which reaction well comprises an inlet portion and an outlet portion, which reaction block comprises at least one pair of substantially opposing recessed regions disposed in opposing surfaces of the reaction block proximal to a midpoint of each surface, which opposing recessed regions mount at least one lid attachment component.

73. The reaction block of claim 72, wherein the reaction block is disposable.

74. The reaction block of claim 72, wherein the reaction block comprises cavities disposed between and proximal to inlet portions of adjacent reaction wells to direct fluidic materials away from other inlet portions.

75. The reaction block of claim 72, wherein at least a segment of the reaction well comprises an inner and an outer cross-sectional shape independently selected from the group consisting of: a regular n-sided polygon, an irregular n-sided polygon, a triangle, a square, a rounded square, a rectangle, a rounded rectangle, a trapezoid, a circle, and an oval.

76. The reaction block of claim 72, wherein at least two regions of the reaction well comprise different inner or outer cross-sectional dimensions.

77. The reaction block of claim 72, wherein one or more reaction wells further comprise a filter disposed therein.

78. The reaction block of claim 72, wherein outlet portions of the array of reaction wells comprise a footprint that corresponds to wells of a micro-well plate.

79. The reaction block of claim 72, wherein the outlet portion comprises an outlet spout having a smaller inner cross-sectional dimension than other regions of the

reaction well, and wherein a transition area between the outlet spout and the other regions in the reaction well is abrupt or tapered.

80. The reaction block of claim 72, wherein the reaction block comprises one or more of: glass, metal, or a polymer.

5 81. The reaction block of claim 80, wherein the polymer comprises polytetrafluoroethylene.

82. The reaction block of claim 72, wherein the reaction block comprises 6, 12, 24, 48, 96, 384, 1536, or more reaction wells.

10 83. The reaction block of claim 82, wherein each reaction well is disposed through the reaction block.

84. A parallel reaction device, comprising:

(a) a reaction block comprising an array of reaction wells, wherein at least one reaction well in the array is disposed through the reaction block, which reaction well comprises an inlet portion and an outlet portion;

15 (b) a top lid attached to the reaction block by at least one top hinge component and at least one top latch component, which top lid comprises at least one protrusion disposed on a surface that engages the reaction block, which protrusion presses a top gasket into contact with the inlet portion to the reaction well to seal the inlet portion; and,

20 (c) a bottom lid attached to the reaction block by at least one bottom hinge component and at least one bottom latch component, which bottom lid presses a bottom gasket into contact with the outlet portion of the reaction well to seal the outlet portion.

85. A reaction block container, comprising:

25 (a) a band that comprises at least one first top hinge component, at least one first top latch component, at least one first bottom hinge component, and at least one first bottom latch component, and wherein portions of the band are capable of being mounted in opposing recessed regions on a reaction block;

(b) a top lid comprising at least one second top hinge component and at least one second top latch component attached to the top lid, wherein the second top hinge

component engages the first top hinge component and the second top latch component removably engages the first top latch component; and,

(c) a bottom lid comprising at least one second bottom hinge component and at least one second bottom latch component attached to the bottom lid, wherein the second
5 bottom hinge component engages the first bottom hinge component and the second bottom latch component removably engages the first bottom latch component.

86. The reaction block container of claim 85, wherein each hinge component independently comprises a male or a female lift-off hinge component.

87. The reaction block container of claim 85, wherein each latch
10 component independently comprises a latch body or a keeper plate.

88. The reaction block container of claim 87, wherein the latch body comprises a rotatable draw latch body.

89. The reaction block container of claim 85, wherein the top lid, the bottom lid, or both lids further comprise at least one protrusion disposed on a surface that
15 engages a reaction block, which protrusion presses a gasket into contact with at least a portion of at least one reaction well when the reaction block container further comprises the reaction block and the gasket.

90. The reaction block container of claim 85, wherein the top and bottom lids open independently of one another.

91. The reaction block container of claim 85, wherein the top lid further
20 comprises an array of apertures disposed through the top lid, wherein at least one aperture axially aligns with at least one reaction well disposed in a reaction block.

92. The reaction block container of claim 91, wherein each member of the array of apertures axially aligns with a different reaction well disposed in the reaction
25 block.

93. The reaction block container of claim 91, further comprising a protruding annular ridge disposed around the aperture.

94. A reaction block container, comprising:

5 (a) a band that comprises at least one first top hinge component, at least one first top latch component, at least one first bottom hinge component, and at least one first bottom latch component, and wherein portions of the band are capable of being mounted in opposing recessed regions on a reaction block;

(b) a top lid comprising at least one protrusion disposed on a surface that engages a reaction block, which protrusion is capable of pressing a gasket into contact with at least a portion of at least one reaction well of the reaction block, and at least one second top hinge component and at least one second top latch component attached to the top lid, 10 wherein the second top hinge component engages the first top hinge component and the second top latch component removably engages the first top latch component; and,

(c) a bottom lid comprising at least one second bottom hinge component and at least one second bottom latch component attached to the bottom lid, wherein the second bottom hinge component engages the first bottom hinge component and the second 15 bottom latch component removably engages the first bottom latch component.

95. The reaction block container of claim 94, wherein each hinge component independently comprises a male or a female lift-off hinge component.

96. The reaction block container of claim 94, wherein each latch component independently comprises a latch body or a keeper plate.

20 **97.** The reaction block container of claim 96, wherein the latch body comprises a rotatable draw latch body.

98. The reaction block container of claim 94, wherein the top and bottom lids open independently of one another.

25 **99.** The reaction block container of claim 94, wherein the top lid further comprises an array of apertures disposed through the top lid, wherein at least one aperture axially aligns with at least one reaction well disposed in a reaction block.

100. The reaction block container of claim 99, wherein each member of the array of apertures axially aligns with a different reaction well disposed in the reaction block.

5 **101.** The reaction block container of claim 99, wherein the protrusion comprises a protruding annular ridge disposed around the aperture.

102. A lid comprising at least one protrusion capable of pressing a gasket into contact with at least a portion of at least one reaction well of a reaction block comprising an array of reaction wells to seal the reaction well when the lid is attached to the reaction block.

10 **103.** The lid of claim 102, wherein the lid comprises an array of protrusions corresponding to the array of reaction wells.

104. The lid of claim 102, further comprising an array of apertures disposed through the lid, wherein at least one aperture axially aligns with the reaction well.

15 **105.** The lid of claim 104, wherein the aperture is tapered.

106. The lid of claim 104, wherein each member of the array of apertures axially aligns with a different reaction well.

107. The lid of claim 104, wherein the protrusion comprises a protruding annular ridge disposed around the aperture.

20 **108.** The lid of claim 102, further comprising at least one attachment component to attach the lid to the reaction block.

109. The lid of claim 108, wherein the attachment component comprises at least one latch and at least one hinge.

25 **110.** A lid comprising at least one latch component and at least one hinge component, which hinge component is capable of engaging at least one other hinge

component and which latch component is capable of removably engaging at least one other latch component, which other hinge and other latch components are attached to a reaction block.

5 111. The lid of claim 110, further comprising at least one protrusion disposed on a surface of the lid, which protrusion presses a gasket into contact with at least a portion of at least one reaction well of the reaction block.

112. The lid of claim 111, wherein the lid comprises an array of protrusions corresponding to an array of reaction wells disposed in the reaction block.

10 113. The lid of claim 110, further comprising an array of apertures disposed through the lid, wherein at least one aperture axially aligns with the reaction well.

114. The lid of claim 113, wherein the aperture is tapered.

115. The lid of claim 113, wherein each member of the array of apertures axially aligns with a different reaction well.

15 116. A lid attachment component comprising a band having at least one hinge component and at least one latch component attached thereto, which band is capable of being mounted in opposing recessed regions disposed on opposing surfaces of a reaction block.

20 117. The lid attachment component of claim 116, wherein the hinge component comprises a male or a female lift-off hinge component.

118. The lid attachment component of claim 116, wherein the latch component comprises a latch body or a keeper plate.

25 119. The lid attachment component of claim 118, wherein the latch body comprises a rotatable draw latch body.